A SYNOPSIS OF THE SPECIES OF THE GENUS *OZOBRANCHUS* (DE QUATREFAGES 1852) HIRUDINEA—ANNELIDA

BY

P. J. SANJEEVA RAJ, M.A.,

Lecturer in Zoology, Madras Christian College, Tambaram

INTRODUCTION

During the course of nearly a century and a half, from its first record in 1791 to the present day, this interesting genus *Ozobranchus* de Quatrefages has been represented by only six species recorded by various authors at different times. This synopsis is mainly intended to help those who are interested in the genus, and who might have occasion to come across it. A list of references of the scanty but complete literature available on the genus up to date is given at the end for the guidance of future workers, and an attempt is also made herein to clarify the systematic position of an ill-defined species, viz., *Ozobranchus papillatus* Kaburaki (1921 *b*), on the basis of certain morphological characters.

Our knowledge of the genus *Ozobranchus* can be traced back to the year 1791, when Archibald Menzies (1791) collected a ' new form of leech ' (as it was called by de Quatrefages 1852) from a turtle in the Pacific Ocean between the tropics, and designated it as *Hirudo branchiata*. Various synonyms have been in use for similar specimens such as *Polydora testudinum* (Oken), *Branchellion pinnatum* (Savigny 1822, Grube) and *Branchiobdella menziesi* (de Blainville, Diesing).

It was Savigny (*loc. cit.*) who recognised for the first time that this belonged to a genus altogether different from *Branchellion*, and in 1852 de Quatrefages suggested the generic name *Ozobranchus* for Menzies's *Hirudo branchiata*. In fact de Quatrefages never saw the specimen, nor did he ever define the genus, but only mentioned that the name *Hirudo branchiata* suggested by Menzies was not quite appropriate and instead, he changed the generic name *Hirudo* to *Ozobranchus* (ΟξΟS = branch) thus implying the branched gills by which the genus is characterised. He called Menzies's specimen *Ozobranchus menziesi*.

Ozobranchus branchiatus (*Hirudo branchiata*) Menzies, as described by Menzies in 1791, was an inch in length and had 7 pairs of gills (branchiae). Menzies's description of this is brief and expressive and is worth quoting.

'H. depressa attenuata albida, setis lateralibus ramosis utrinque 7 interaneis fuscis bifidis ferlucentibus.

Habitat, in oceano Pacifico, testudini adhaerens '

Similar specimens were later obtained in 1856 by Mr. Rayner, Surgeon of H.M.S. ' Herald ' from the body of a turtle in Shark's Bay, Australia. These measured only half an inch in length (Baird 1869).

In course of time, the genus *Ozobranchus* de Quatrefages had various synonyms in use. Baird (1869) suggested the generic name *Eubranchella* and described Menzies's specimen as *Eubranchella branchiata* as the only species of the genus available up to 1869. Poirer et de Rochebrune (1884)

used the generic name *Lophobdella*. Apathy (1890) collected several hundred specimens of a different species from the body of a single individual of the turtle *Thallasochelys corticata* in the Bay of Naples. His specimens were characterised by the presence of only 5 pairs of branchiae and he suggested the generic name *Pseudobranchellion*. His specimens of *Pseudobranchellion margoi* (Apathy) were included in a new family *Chelyobdellidae* intermediate between the families *Ichthyobdellidae* and *Clepsinidae*.

Leon Vaillant (1890) seems to have adopted the generic name *Ozobranchus* and treated it under the sub-family *Branchellionae* of the family *Ichthyobdellidae*. It was Oka (1895, 1904 & 1910) who studied the detailed anatomy of the species *Ozobranchus branchiatus* Menzies, and classified the genus along with *Pontobdella*, *Ichthyobdella* and *Trachelobdella* as opposed to *Carcinobdella* and *Piscicola*.

Harding (1909 & 1927) described leeches collected from Ceylon by Miss Robertson from the body of the terrapin *Nicoria trijuga*. These were characterised by eleven pairs of gills and biannulate abdominal somites and were designated as *Ozobranchus shipleyi*. Shortly after this Oka (1912) collected yet another species from Wuchung, China, identified as *Ozobranchus jantseanus* but with triannulate abdominal somites. Oka (1912) mentioned only three species of the genus to be existing, viz. *O. margoi*, *O. branchiatus* and *O. jantseanus*.

Kaburaki (1921 *a*) described some leeches from the Indian Museum, which were collected from a tortoise *Kachuga donghoka* in the zoological gardens, Calcutta. These, he found to be resembling *O. jantseanus* of Oka (1912), but later they were considered synonymous with *O. shipleyi* Harding (1927). Along with these Kaburaki (1921 *b*) described a new species of *O. papillatus* collected from the body of *Kachuga tectum* in Narbada River in Nagpur. These are characterised by equal-sized abdominal annuli each with a row of conical papillae. Harding (1927) considered this *O. papillatus* also synonymous with *O. shipleyi* which is open for discussion (*vide infra*).

MacCallum (1918) and Nigrelli (1943) obtained a large number of specimens of *O. branchiatus* Menzies, from the body of *Chelone mydas* and studied the anatomy and bionomics of the species in detail.

Lastly, Sanjeeva Raj (1951) collected a new species of *Ozobranchus polybranchus* from the leg of a tortoise *Pelochelys bibroni* on the bank of the river Kille in Porto Novo, South India, which is diagnosed by twenty pairs of digitiform gills and biannulate abdominal somites.

Family **Ichthyobdellidae**

Genus *OZOBRANCHUS* de Quatrefages 1852

Hirudo	...	Menzies 1791 *Trans. Linn. Soc.*, London. I. P. 188, Fig. (3).
Polydora	...	Oken
Branchellion	...	Savigny 1822 *Syst. des. Annel. l.c.*, p. 109.
Branchiobdella	...	De Blainville 1827 *Syst. des. Annel. l.c.*, p. 556.

Ozobranchus de Quatrefages 1852. *Ann. Sci. Nat.* (*Zool.*) 3, xviii p. 325.

Eubranchella Baird 1869. *Proc. Zool. Soc.*, London, pp. 311–312.
Pseudobranchellion Apathy 1890. *Orvos-termesz, Ertesito*, pp. 110-113 and pp. 122–127.
Ozabranchus Oka 1895, *Zool, Mag.* Tokyo, VII, No. 75.

Body small, divisible into an anterior narrow part the neck, and a posterior broad abdomen, neck biannulate and abdomen bi-or triannulate, usually unequal sized annuli. Abdomen carries lateral, branched, digitiform gills (branchiae) variable in number from 5 to 21 pairs, posterior sucker is large and powerful. Eyes may or may not be visible in adults. Transverse row of papillae may be present on the abdominal annuli. Ectoparasites on marine as well as fresh water chelonians.

Species 1. *OZOBRANCHUS BRANCHIATUS* (Menzies) 1791

Hirudo branchiata Menzies 1791. *Trans. Linn. Soc.*, London, 1. p. 188.
Polydora testudinum Oken.
Branchellion pinnatum Savigny, Grube, *Syst. des. Annel. l.c.*, 109.
Ozobranchus menziesi de Quatrefages, 1852. *Ann. Sci. Nat.* (*Zool.*) (3), xviii, p. 325.
Eubranchella branchiata Baird 1869. *Proc. Zool. Soc.*, London, pp. 311–312.
Ozobranchus branchiatus Oka 1895. *Zool. Mag.*, Tokyo, vii, No. 75.

Diagnosis.—Seven pairs of lateral digitiform gills (branchiae) in the anterior half of the abdomen and each gill with 4–5 branches. Neck short and protrusible, not prominent. Eyes may be sunk in below the parenchyma in adults and not visible externally. Mouth terminal, ventrally directed. Anus dorsally placed at the base of the posterior sucker. Male genital opening close in front of the female, on the ventral side of the anterior one-third the length of the body.

Dimensions.—Length 6-25 mm., maximum width of body 3-5 mm., diameter of posterior sucker 2-5 mm., length of a gill 1·5-2 mm., colour usually dirty white.

Hosts and habitat.—Menzies collected it from a turtle in the tropical Pacific. Mr. Rayner collected specimens from a turtle in Shark's Bay, Australia. MacCallum (1918) collected specimens from *Chelone mydas* in Key West, Flanders, and Nigrelli (1943) from the fibroepithelial tumours of *Chelone mydas* caught off the coast of Florida.

Remarks.—It is recorded by Nigrelli (1943) that these leeches are to some extent responsible for the growth of the fibroepithelial tumours of the turtle *Chelone mydas* from which they are collected. The hirudin of these leeches is observed to help the growth of the tumours. From a space of about half a square inch on the tumours, as many as 50 leeches were collected.

Eggs of these leeches are fastened to the skin of the turtle, and a chitinous membrane covers them till they are hatched. Two eyes are visible in the young ones, but in the adults they are shown by MacCallum (1918) to have sunk deep into the parenchyma, and are functionless.

Species 2. *OZOBRANCHUS MARGOI* Apathy 1890

Pseudobranchellion margoi Apathy 1890. *Orvos-termesz Eresito*, pp. 110-113 and pp. 122–127.

Ozobranchus margoi Oka 1912. *Annot. Zool. Jap*, viii, pp. 1–4.

Diagnosis.—By the presence of 5 pairs of lateral digitiform gills (branchiae) in the abdominal region.

Hosts and habitat.—Collected from the body of *Thalassochelys corticata* in the Bay of Naples (Mediterranean).

Remarks.—Apathy (1890) created a new family known as Chelyobdellidae for these leeches and placed it intermediate between the families Ichthyobdelildae and Clepsinidae. Apathy (1902) worked out the histology of the light sensory cells of this species.

Species 3. *OZOBRANCHUS SHIPLEYI* Harding 1909

Ozobranchus shipleyi Harding 1909. *Proc. Cam. Phil. Soc.*, xv, pp. 233–234.

Ozobranchus shipleyi Harding 1927. *Faun. Brit. Ind.* (Hirudinia), p. 37.

Ozobranchus jantseanus Kaburaki 1921 *a.* (Not. Oka) *Rec. Ind. Mus.* 1921, xxii, p. 691.

Diagnosis.—Characterised by the presence of 11 pairs of digitiform branchiae in the abdominal region. Somites of the neck region are biannulate, and the annuli are of equal size. The abdominal somites also are biannulate (Harding 1927) but the anterior annulus is larger and carries a row of multipointed papillae. Branchiae arise from the anterior annulus. Two eyes are visible. Anterior sucker carries the ventrally directed mouth. Anus is dorsal at the junction of abdomen and posterior sucker. Two genital openings close to each other are on the ventral side of the first abdominal somite.

Hosts and Habitat:—Collected for the first time from the terrapin *Nicoria trijuga* in Ceylon by Miss Muriel Robertson. Later Indian specimens were collected from the body of *Kachuga donghoka*, *K. smithi* and *K. intermedia* from Rajmahal, Mahanadi, and Ravi respectively. The inclusion of *O. papillatus* Kaburaki as synonymous with *O. shipleyi* Harding is discussed below.

Species 4. *OZOBRANCHUS JANTSEANUS* Oka 1912

Diagnosis.—Eleven pairs of lateral abdominal gills each with 4 to 7 branches. Abdominal somites are triannulate. Eyes are two in number, and are on the dorsal side at the anterior end. Posterior sucker semicircular and powerful.

The male and female genital openings are situated close to each other on the ventral side of the base of neck.

Dimensions.—Length 9 mm., width 2 mm., diameter of posterior sucker 2 mm.

Hosts and habitat.—Collected by Mr. Usui from a turtle at Wuchung, China.

Remarks.—Kaburaki's specimens of *O. jantseanus* Kaburaki (1921 a) are actually synonymous with *O. shipleyi* Harding, because of the biannulate abdominal somites.

Species 5. *OZOBRANCHUS PAPILLATUS* Kaburaki 1921 b.

Diagnosis.—Eleven pairs of lareral abdominal gills. Biannulate abdominal somites. Annuli are of equal size and a row of single sharp-pointed papillae on each annulus. Eyes not visible.

Dimensions.—Strongly contracted specimens measure 7 mm. in length and 4 mm. across the widest region of the body. Colour plain grey.

Hosts and habitat.—Mr. A. E. D'abreu collected from the body of the tortoise *Kachuga tectum* from Narbada in Nagpur.

Remarks.—Harding (1927) considers *O. papillatus* Kaburaki as synonymous with *O. shipleyi* Harding, but I think the species as designated by Kaburaki (1921 *b*) is mainly based on the absence of any trace of eye-like organs, which is not a sufficiently strong point, and his failure to notice any eyes might be due to the fact that eyes sink into the parenchyma below the skin in the adult, as is shown by MacCallum (1918) in the case of *O. branchiatus* Menzies. Kaburaki obviously has not studied the internal anatomy of the species. Nevertheless the fact that each abdominal somite carries two annuli of equal size and a row of sharp single-pointed papillae on each annulus, seem to be markedly distinct features not observed in *O. shipleyi* Harding with which it is said to be synonymous. On the basis of these rather important characters, I feel that *O. papillatus* Kaburaki can be retained as a distinct species by itself. The size of the annuli and the presence of the papillae and their structure are diagnostic features in the morphology of Ichthyobdellan leeches.

Species 6. *OZOBRANCHUS POLYBRANCHUS* Sanjeeva Raj 1951

Diagnosis.—Characterised by the presence of 20 pairs of lateral, abdominal, digitiform gills. Abdominal somites are biannulate and the anterior annulus broader than the posterior. Two oval eyes at the anterior end on the dorsal side. Mouth in the middle of the anterior sucker which is semicircular and ventrally directed. Anus dorsal at the junction of abdomen and posterior sucker which is circular. Genital openings on the ventral aspect of first abdominal somite. Each gill carries 8 to 24 digitiform processes.

Dimensions.—Length 32 mm. in alcohol. Maximum width of body 5 mm. Posterior sucker (diameter) 5 mm. Length of a gill 1·5-2 mm. Colour dull green on the dorsal side and pale yellow on the ventral side.

Hosts and habitat.—Collected from the leg of the tortoise *Pelochelys bibroni* on the river Kille in Porto Novo, S. India.

Remarks.—Gills were actually 21 on the right side and 20 on the left side. No mutilated gill was seen on the left side.

Key and Table for the Identification of Species.

1. 5 pairs of gills (branchiae) ... *margoi*
2. 7 pairs of gills ... *branchiatus*
3. 11 pairs of gills
   - (i) triannulate abdominal somites ... *jantseanus*
   - (ii) biannulate abdominal somites
     - (*a*) unequal-sized annuli, and a row of multi-pointed papillae on anterior annulus alone ... *shipleyi*
     - (*b*) equal-sized annuli, and a row of single-pointed papillae on each annulus ... *papillatus*
4. 20 pairs of gills and biannulate abdominal somites ... *polybranchus*

Species	No. of gills.	Abdominal somites	Papillae	Eyes	Length	Hosts and habitat	Locality
O. margoi ...	5 pairs	not known	not known	present	Not known	*Thalassochelys corticata* (marine)	Bay of Naples
O. branchiatus ...	7 pairs	tri-annulate	absent	present (sunk below in adults)	6-25 mm.	*Chelone mydas* (marine)	Pacific
O. shipleyi ..	11 pairs	bi-annulate	present on only anterior annulus	present	5-25 mm.	*Nicoria trijuga* (marine)	Ceylon
O. jantseanus ...	11 pairs	tri-annulate	absent	present	9 mm.	turtle (brackish water)	Wuchung, China
O. papillatus ...	11 pairs	bi-annulate	present on all annuli	not visible	7 mm. (contracted)	*Kuchuga tectum* (fresh water)	Narbada River, India.
O. polybranchus ...	20 pairs	bi-annulate	absent	present	32 mm.	*Pelochelys bibroni* (brackish water)	Kille River, S. India.

Affinities and evolution.—The resemblances of the genus *Ozobranchus* to the genus *Branchellion* are not only superficial in having the branchiae of similar structure but they are more deep rooted in their nature. It has been shown by de Quatrefages (1852) that the blood vessels of *Branchellion* are closed and have no connection whatsoever with the body cavity, which is branched and which supplies the haemocoelomic-fluid to the gills. A similar condition is observed by Oka (1895 and 1904) in *Ozobranchus branchiatus* Menzies. Hence with regard to this and many other features the genus *Ozobranchus* possesses closer affinities to the genus *Branchellion* than any other Ichthyobdellan. In fact our knowledge of the internal anatomy and embryology of the genus is too incomplete to justify any attempt to explain the evolution within the genus itself. Nevertheless the progressive increase in the number of gills from *O. margoi* to *O. polybranchus* can be looked upon as a transitory basis of evolution till the genus is more thoroughly understood.

Geographic distribution.—The genus *Ozobranchus* has been recorded from the Australian, Palaearctic, Nearctic, and Oriental Regions.

Australian Region.

O. branchiatus (Menzies). Shark's Bay, Australia.

Palaearctic Region.

O. margoi (Apathy). Bay of Naples, Mediterranean.
O. jantseanus (Oka). Wuchung, China.

Nearctic Region.

O. branchiatus (Menzies). Key West & Florida.

Oriental Region.

O. shipleyi Harding. Ceylon and India.
O. papillatus Kaburaki. R. Narbada, N. India.
O. polybranchus Sanjeeva Raj. R. Kille, S. India.

O. branchiatus (Menzies) has been recorded from both the Australian and American (Nearctic) Regions, but it is abundant in the latter.

Hosts and habitat.—The members of the genus have been recorded always as ectoparasites on marine turtles and fresh water tortoises. There seems to be no specificity of the host within the Chelonians, for, the same species of leech is collected from different species of tortoises. It has been shown by Nigrelli (1943) that they feed on blood of the host, and breed on its body. The eggs are attached to the host and covered over by a chitinous membrane till the young are hatched out. These leeches are extremely contractile in life.

References

Apathy, S. (1890): *Orvos-termesz. Ertesito*, 1893, pp. 110-113 in Czech, and pp. 122-127 in German.
———, (1901): *Verh. Congr. Zool.* V. Berlin, 1901, pp. 707-728.
Baird, W. (1869): *Proc. Zool. Soc.*, London, 1869, pp. 311-312.
Blainville, H. M. D. de. *Syst. Annel. l.c.*, p. 556.
de Quatrefage, (1852): *Ann. Sci. Nat.* (*Zool.*), (3), **xviii**: 325.
Harding, W. A. (1909): *Proc. Cam. Phil. Soc.*, **xv**: 233-234.
———————— & Percy Moore, 1927, Faun. Brit. Ind. (Hirudinia).
Kaburaki, T. (1921 *a*): *Rec. Ind. Mus.*, **xxii**: 691.

Kaburaki, (1921 *b*) : ibid, p. 692.
Leon Vaillant, M. (1890) : *Histoire Naturelle des Anneles Marins Et D'eau Douce*, Vol. III, Part II, p. 525.
MacCallum, W. G. & MacCallum G. A. (1918) : *Bull. Amer. Mus. Nat. Hist.*, **xxxviii,** pp. 395-408.
Menzies, A. (1791) : *Trans. Linn. Soc.*, London, I, p. 188, fig. 3.
Moquin-Tandon, A. (1846) : *Monographie de la famille des Hirudinies*, pp-281-282.
Nigrelli, R. F. & Smith, G. M. (1943) : *Zoologica*, New York, **xxviii** : 107-108.
Oka, A. (1895) : *Zool. Mag.*, Tokyo, **vii**, No. 75.
—·— (1902) : *Annot. Zool. Jap.*, **iv**, p. 49.
—·— (1904) : ibid, **v**, p. 133.
—·— (1910) : ibid, **vii**, p. 165.
—·— (1912) : ibid, **viii**, pp. 1-4.
—·— (1917) : *Mem. As. Soc. Bengal*, **vi.**
Porier et de Rochebrune, S. (1884) : *C. R. Ac. Sci.*, **xcviii**, p. 1597.
Sanjeeva Raj, P. J. (1951) : *J. Zool. Soc. India*, 3 (I) : 1-5.
Savigny, J. C. (1822) : *Syst. des. Annel l.c.*, p. 109.
Sukatschoff, (1912) : *Mitth. Zool. Stat. Naples*, **xx** : 395.